

Mathematics Learning Devices Development based on Character Education through PBL Integrated Scientific Approach for Grade V

Megawati

Faculty of Education
Universitas Negeri Padang
Indonesia
megawati@fip.unp.ac.id

Nelwandi Nelson

Faculty of Education
Universitas Negeri Padang
Indonesia

Lusi Diharneli

Faculty of Education
Universitas Negeri Padang
Indonesia

Abstract—This study aims to produce educational learning based on character and mathematics through PBL. Integrated scientific approach that is valid, practical and effective. This development research uses Mc Kenney's model which consists of 3 stages, namely *preliminary*, *prototyping* and *assessment*. The results showed that the tools of character education based learning with PBL Integrated scientific approach developed had met valid criteria in terms of constructs and contents. The results of observations, questionnaires and interviews stated that the learning tools were practical in terms of ease and implementation by students. Effective learning tools develop the character of critical thinking, friendly / communicative, disciplined, honest, hard work, creative, independent, responsibility and tolerance of students. Learning tools have also been effective in terms of developing students' positive activities and student learning outcomes that are more than 70% achieving KKM. Based on these results, it can be concluded that the mathematics learning device is based on character education PBL Integrated scientific approach for fifth grade elementary school students that have been produced can be declared valid, practical and effective.

Keywords—*mathematics learning devices; character education; pbl approach integrated scientific approach*

I. INTRODUCTION

Based on Law No. 20 of 2003 concerning the National Education System article 3 which states that National Education aims to develop the potential of students to become faithful and fearful people of God Almighty, noble, healthy, knowledgeable, capable, creative, independent and become citizens democratic and responsible b. The written word of noble character in the formulation of the goals of national education above implies that the Indonesian nation aspires to noble character to be part of the national character that has the philosophy of Pancasila.

Based on the facts regarding the decline of student ethics and morals, there are many problems related to national character such as cases of sexual violence, promiscuity and

drug abuse that show the collapse of the national character that has the philosophy of Pancasila. In addition, the quality of education in Indonesia is still relatively low seen in the 2009 PISA survey, which ranked Indonesia 61st out of 65 countries in the field of mathematics [1] [2] [3]. The low student learning outcomes are closely related to the weakening of the ability to think critically and creatively students learning mathematics.

In response to this, the government seeks to develop character education through the 2013 curriculum program. Through the development of the 2013 curriculum that is character-based and competency-based, it is expected that this nation will become a dignified nation, and the community has *added value*, a selling value that can be offered to people. others and other nations in the world, so they can compete with other nations.

Based on the results of document analysis in several primary schools in Padang Pariaman district, the teacher has seen the learning tools prepared. Form of Learning Implementation Plans (RPP), but the RPP that is designed has not been optimal in developing positive character of students. Where RPP has not been found, it is arranged in a contextual approach that in its learning steps can develop positive characters and empower students' potential to construct their own knowledge that relates to the real world instead of presenting material instantly.

Based on observations in class V at Nan Sabaris 05 Elementary School, it was seen that students had teaching materials in the form of a Student Worksheet (LKS) in the form of a summary of material and practice questions in the form of objective, content, and essays. This causes worksheets in learning to only function as a reference source for questions for practice questions or PR for students. LKS has not been found that contains guidelines for student activities to find concepts or construct their own knowledge and can develop positive character of students that relate to everyday life.

In addition, based on the results of interviews with some students of Nan Sabaris 05 Elementary School, it can be concluded that in general students who get high math test scores, after the test they forget the lesson. In doing different exercises with examples of some students who are not confident and independent, many of them are cheating on the answers of their smart friends. One of the factors that can cause low student learning outcomes is teacher-dominated learning, giving students less opportunity to think critically and creatively to construct their knowledge. This can be seen from the results of the first semester mathematics test results of fifth grade students at SD Sab 05 Nan Sabaris shows the number of students who have not reached completeness with the Minimum Completeness Kriteria (KKM), which is 75. Where students get scores above the 10 people KKM and who are not complete 16 people from 26 students.

Responding to this, it is necessary to create a learning process that activates and develops the character of students who associate material with the real world. One alternative is to use PBL Integrated scientific approach in learning mathematics in elementary school. PBL Integrated scientific approach I facilitate students to find a concrete learning experience (related to real life) through a try, do, and experience for yourself. Thus, learning is not only seen from the results, but the most important is the process.

Seeing this fact, it is necessary to develop a tool for character education based learning by implementing PBL Integrated scientific approach. Learning Principles in PBL Integrated scientific approaches are: constructivism, inquiry, asking, learning communities, modeling, reflection, and actual assessment. Learning tools that will be developed consist of RPP and LKS. In this character-based learning tool, the seven principles in the contextual approach will be applied to the part that is in accordance with the material content that is studied both in the RPP and LKS to be developed.

II. METHOD

Developing a learning device based matematika pendidikan characters with PBL Integrated scientific approach Using the Mc Kenney Model which consists of three stages: preliminary, prototyping and assessment .

III. RESEARCH RESULTS AND DISCUSSION

A. *Validity Based Learning Device Karakter Pendidikan with PBL Integrated scientific approach*

To produce a valid mathematics learning device, the following steps are carried out.

1) *Preliminary Stage*

a) *Curriculum Analysis Results*

The curriculum analysis focuses on core competency analysis (KI) and KD in the 2013 curriculum. Based on the analysis results The KI and KD contained in the content standard are translated into dictators of learning achievement, especially with regard to the character values to be developed . After the analysis is done, the addition of KD and indicators related to solving problems related to daily life

are carried out. This is done because the PBL model integrates scientific approaches students are required to be able to apply the concepts that have been learned in questions related to daily life [4].

b) *Concept Analysis Results*

Concept analysis aims to determine the content and subject matter needed in the development of learning tools. As for the material of elementary school V grade mathematics in the second semester is the volume of cubes and beams [5].

c) *Results of Student Characteristics Analysis*

5th grade students of SD Sabari Nan Sabaris But in the learning process, there are still many students who experience difficulties in understanding abstract mathematical concepts. Therefore, to facilitate students to understand the concept of mathematics learning should begin with the introduction of problems that are appropriate to everyday situations. So it is important to develop learning tools with a contextual approach.

Based on the results of interviews with several fifth grade students of Nan Sabaris Elementary School 05, it was found that students preferred to learn with illustrations related to the material. Students are more likely to like bright colors. In learning activities students often feel bored because the teacher is too long to explain the lesson, and to get rid of the saturation they are permitted to come out, talk to friends. Students are less happy to use LKS because it only contains a summary of the material in the form of definitions and formulas with too many questions. In working on the questions on the student worksheets students prefer to work together, but still often late collecting it for a long time in answering difficult questions.

Based on the results of the analysis of the characteristics of these students, the LKS is designed to facilitate students to be active in learning and to develop positive character of students, by presenting interesting activities so that students are not bored in learning. For this reason, it is necessary to develop worksheets that contain student activities that can improve their understanding, build new knowledge by linking learning with students 'daily lives so that the concepts learned can last a long time in students' memories. In learning using LKS students will learn in groups and discuss in solving real and abstract problems, so that this activity can facilitate the development of the character of cooperation, a sense of responsibility and tolerance for solving different problems in discussion. Furthermore, when learning takes place, students will present the results of the discussion in front of the class so that this can facilitate the communicative character of students in showing their abilities in front of the class. .

Language and use of sentences in worksheets are adjusted to the level of development of fifth grade elementary school students, so students are easier to learn LKS. The presentation of student worksheets is also designed using bright colors, which make students more excited, and flared with illustrative images that help students understand the concept.

2) Prototype Design Results

a) Practical RPP

The RPP is prepared in accordance with its components according to Permendikbud No. 65 of 2013, the RPP component consisted of (1) school identity, (2) subjects, (3) classes, (4) basic material (5) time allocation, (6) core competencies, (7) basic competencies, (8) Indicators, (9) Learning objectives, (10) Brief Description of Materials, (11) Learning approaches and methods, (12) Learning activities, (13) Resources and media, and (14) Assessment. The learning activities are presented in the RPP based learning refers to the integrated character education in pendidikan based LKS characters through PBL model of integrated scientific approach.

b) Characteristics of LKS

The characteristics of LKS are divided into several aspects, namely as follows:

(1) Didactic Aspect

LKS begins with presenting contextual questions or problems that aim to help students to associate the phenomena observed with the concepts to be discovered. The order of material in the worksheets is arranged according to the logical learning path.

LKS is equipped with daily problems and learning steps that can facilitate students to think critically and creatively in constructing their knowledge

Activities in LKS are designed to motivate students to ask questions. LKS is equipped with guided discovery activity guides so that students are independent and work hard to find their own concepts. LKS is designed to foster a character of tolerance, and cooperation in learning discussion activities

LKS is designed to help students to think creatively in translating contextual problems into everyday life into everyday language. LKS is equipped with a reflection guide that can develop attitudes

(2) Content Aspect

The material is adapted to the ability of class V elementary school students and is equipped with examples of questions and exercises that are appropriate to students' cognition. LKS is equipped with pictures relating to the material being studied so that the learning process runs smoothly, interestingly and is fun.

(3) Language Aspects

LKS use simple language and komunikatif and in accordance with high levels of primary school students of communication so that the presentation of the material in BLM can be well understood. The questions in the worksheets are arranged in clear sentences so that they are able to direct students to get the expected answers.

(4) As pitch Presentation

LKS is designed with colors that bervariasi and bright, such as pink, blue, purple and so on. It aims to generate interest in students, because generally students of class V SD liked bright colors.

3) Learning Device Validation Results

The results of learning device design in the early stages are called prototypes 1. To obtain valid learning tools, the learning level is then validated.

a) Results of Self Evaluation Learning Tools

(1) Results of Self Evaluation RPP

RPP that has been designed is evaluated by RPP self evaluation instrument. The aspects evaluated are aspects of the RPP component, the characters to be developed and the PBL model components Integrated scientific approach. After evaluating the results obtained are that the RPP that has been designed has fulfilled the aspects that have been set.

(2) Results of Self Evaluation Worksheet

The LKS that has been designed is evaluated by the LKS self evaluation instrument. The evaluated aspect is the steps through PBL model Integrated scientific approach, language use, image presentation, and practice questions. After an evaluation, the LKS is revised. The revision is done on LKS namely, adding questions related to daily life and improving the use of language in LKS.

b) Results of Validation of Learning Devices by Experts.

The next learning device was discussed with the supervisor. Learning devices are validated by 5 validators. The lecturers who became validators came from 3 fields of expertise namely mathematics, educational technology and language. The following are the results of the learning device validation.

(1) Designing Lesson Plan (RPP)

Aspects assessed in RPP are aspects of RPP components and aspects of learning activities. During the RPP validation stage there are several revisions made based on suggestions from the validator. The results of the evaluation of the validator as a whole RPP developed are declared valid.

(2) Students Worksheet

The aspects observed were in the worksheets the didactic, content, language and presentation aspects. The results of the evaluation of the validator as a whole LKS developed are declared valid.

B. Device practicalities Character Education-based Learning through PBL model Integrated scientific approach

After the validation process is complete, improvements are made to prototype 1 according to the validator's suggestion. Revised the first prototype is called the prototype 2. Next, test the practicalities of character education based learning tools through PBL model Integrated scientific approach.

1) Individual evaluation results (one-to-one evaluation)

LKS is tested on a child (one-to-one) who is asked to work on LKS. People's evaluation per person is done 6 times.

The results of the interview analysis were carried out by illustrating that the presentation of worksheets was very interesting and helpful in understanding the material. The use of language in LKS can be understood well, but there are parts

in LKS that are not clear in the instructions, making it confused to do it. S ISWA difficulty modeling the concerns expressed in soal contextual questions on the worksheet. Therefore a revision is done by presenting the problem model of contextual questions in the form of images that facilitate students in solving them.

2) Small group evaluation results (small group)

After the revision, the LKS tested on Small group, namely the practice of learning tools that have been designed on a group of students consisting of 8-12 people. The evaluation of this small group was carried out on the fifth grade students of GO GO elementary school totaling 8 people from high, medium and low abilities. At the end of the meeting students will be interviewed to find out the practicality of LKS.

The results of the interview analysis illustrate that they are very happy to learn with a worksheet based educate characters by going through PBL model Integrated scientific approach. The activities in the LKS are interesting, the presentation of pictures and illustrations on LKS makes it easy for them to understand the concept of the material they are studying. The questions on LKS are very diverse, starting from the easy ones with difficult questions. Students are less accustomed to expressing their opinions about a material concept, if the worksheets have an order asking students to find the concept. In addition, in solving the problem of contextual problems, students are not careful in interpreting the purpose of the problem which consequently students cannot solve the problem.

3) Field Test Results (Field Test)

After being revised based on input from small group evaluations, the device was tested on the research subject, namely class V Nan Sabaris SDN 05 numbering 26 student.

a) Results of the Prediction of Practicality Questionnaire according to Experts

The average practicality score obtained by experts is 82.14 % included in the practical category. This means that experts predict that practical worksheets are used for learning.

b) Results of the Practicality Questionnaire according to Teacher

The average score obtained is 84,72 % in the very practical category. This means that the worksheet is based on education based on characters through PBL model Integrated practical scientific approach according to the teacher.

c) Results of the Practicality Questionnaire by Students

The average practical score obtained was 82.14 % included in the very practical category. This means that the worksheet is based on education based on characters through PBL model Integrated scientific approach practical according to students.

d) Results of Observation of Learning Implementation.

Based on the results of observation, it is known that the implementation of learning by using LKS based on character education is through PBL model Integrated scientific approach has gone well. In addition, learning activities are also in accordance with the available time, although at the beginning

there were some imperfect activities carried out due to time constraints such as discussion of practice questions.

C. Effectiveness of Education and Character Based Learning Devices through PBL model Integrated scientific approach

Learning device that has dipraktis, then tested on class V SDN 05 keefektifan Sabaris to see her. Keefektifan instructional device seen from hasil student activity and learning.

1) Student activity.

Student activity data is obtained during learning activities by using student worksheets based on character education through PBL model Integrated scientific approach. activity to ask questions, express opinions, carry out initial activities, construct and exercise activities including very few categories. However, these five activities tend to increase. At the first meeting, there were very few students who wanted to respond to questions from the teacher and express their opinions. Most students are accustomed to answering questions simultaneously. In addition, students are less enthusiastic about starting activities, constructing and doing exercises. So the teacher tries to lure students by giving motivation. At the next meeting, these five activities tend to increase. Students begin to get used to finding concepts and constructing images related to the material, even though there are some students who have difficulty describing precisely the problems related to distance.

In addition, the percentage of student activities for students' negative activities such as daydreaming, disturbing friends, and playing in other classes at the first meeting included a few and many categories with a range of 33% to 4 % 8%. Furthermore, for the next meetings these three activities tend to decline. However, there are still students who do not work on the requested activity. As a result, from the first meeting to the last meeting, these four activities have never received a 100% percentage.

Based on the data that has been obtained, it can be recognized that the positive activity of students in learning tends to increase. This shows that the pendid - based fish character learning device through PBL model Integrated scientific approach can increase student activity.

2) Learning outcomes

Based on the results of the final test showed that students whose scores above the KKM were 21 students from 26 students. Means that the completed student score is 80.77% and that is incomplete as much as 19.23% of students who take the exam. There are still students who have not succeeded in achieving the KKM, probably due to the ongoing learning process. Students do not focus on the discussion and are not serious about doing the exercises, causing students to be unable to answer test questions properly. From the results of this final test, it is known that more than 70% of students are above the KKM. It can be concluded that student learning outcomes after using the device pendidikan character-based learning through PBL model Integrated scientific approach is increasing. This shows that educational character -based learning devices go through

PBL models Integrated scientific approaches have been effective for improving student learning outcomes .

3) Results of Assessment of Student Character

Based on data from observations of students' characters it was found that the attitude of students in the good category with an average grade of 73.04 %. From the first meeting to the third meeting, it showed that students' attitudes had increased. This shows that by using character education based learning tools through PBL model Integrated scientific approach to student attitudes is better in the learning process. It can be said that the development of education-based character learning devices through PBL model Integrated scientific approach shows that student character continues to develop towards more positive.

IV. CONCLUSION

Based on the results of the study can be concluded as follows:

- A. *Mathematical learning tools based on character education through PBL model Integrated scientific approach was developed through several stages, namely preliminary, prototyping and assessment .*
- B. *The results of the validation of the validator show that education-based teaching materials karakter through PBL model Integrated scientific approach developed for semester II is valid. That means , Learning tools that have been developed have assessed what should be assessed according to the competencies formulated in the syllabus.*
- C. *The results of trials conducted on fifth grade students of Nan Sabaris Elementary School 05 showed that teaching materials were based on character education through PBL models Integrated scientific approaches are practical.*

Based on observations of student learning activities and results, it can be stated that RPP and LKS are based on education through characters PBL model Integrated scientific approach which has been produced, effective in increasing activity, helping students to complete learning outcomes in school and helping develop positive character of students.

V. SUGGESTION

- A. *Education based character learning devices through PBL model Integrated scientific approach can be used as an example for teachers in developing other learning tools while maintaining contextual principles .*
- B. *For mathematics teachers and researchers who will use educational character -based learning tools through PBL model Integrated scientific approach to be able to pay attention to the allocation of time when implementing learning, because in the learning process using seven components and PBL models students will take a longer time .*

References

- [1] Akker, J. Van den. 1999. *Design Approaches and Tools in Education and Training* . London: Kluwer Academic Publisher
- [2] Angguni, Rafiq. 2011. "Development of Contextual Based Mathematics Learning Devices in Three Dimensional Space Materials in Class X SMA Negeri 1 Sungayang" . *Thesis* . Padang: UNP Postgraduate Program
- [3] <http://emarakhmawati.blogspot.com/2013/05/penurunan-nilai-moral-pada-remaja.html>
- [4] Megawangi, Ratna. 2007. *Character Education the Right Solution to Build the Nation. Second Print, (revised)* Bogor: Indonesia Heritage Foundation.
- [5] Center for Curriculum (Puskur). 2010a. *Grand Design of Character Education*. Jakarta: Kemdiknas.